Getting Connected Workshop

What's all the
Fuss about CMM?

HHSDC
California Health and Human
Services Agency Data Center

1

Agenda

- **What is CMM?**
- **Why is it useful to SID?**
- **What does CMM mean to me?**
- **How does CMM work?**
- **What's the difference between SA-CMM and SW-CMM?**
- **An example of a CMM assessment**

2

Standish Group - CHAOS Study

In the U.S. in 1995, $250 billion / year spent on information technology for 175,000 software projects
• 31% of projects canceled before completion
• 53% of projects cost 189% of original estimates
• spend $81 billion for canceled software projects

Only 16% of software projects completed on-time and on-budget

http://www.standishgroup.com/chaos.html

April 2000   4   Executive Intro to SPI

Myth: Software Problems Are "Technical" Problems

Examined real-life case studies
• Defense Science Board Task Force on Military Software report, 1987
• "Bugs in the Program" report, 1989
• red teams, assessments, evaluations, …

Well-known, consistent problems – revealing a major gap between the state-of-the-art and the state-of-the-practice

The major problems in software development are managerial – not technical.

Sept 2001   13   History of CMM

SECAT LLC
measurement based improvement

Capability Maturity Models: Standards for Organizational Measurement and Improvement

Research performed on how to best transition an organization from chaotic to continuously improved product development

Started with work done by IBM in early 1980's, developed into Capability Maturity Model in mid to late 1980's by Software Engineering Institute (Carnegie Mellon University)
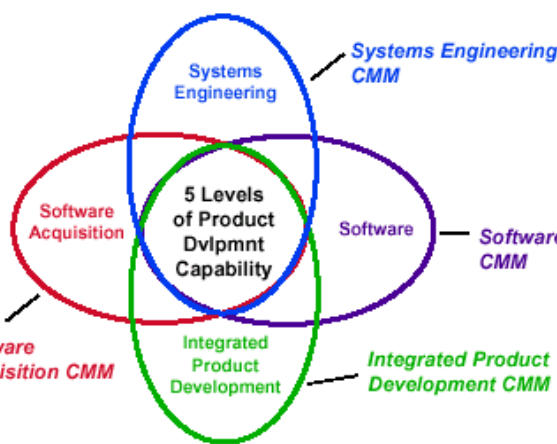
Broke the transition from chaos to continuously improved into a sequence of 5 levels

Developed a method for a company to measure itself against the 5 levels

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SECAT LLC
measurement based improvement

All CMMs Use the Same 5 Levels

- Numerous CMMs have been developed since the initial introduction of the Software CMM

- US Department of Defense pushing an effort to Integrate CMMs (National Defense Industries Association effort)

Systems Engineering

Systems Engineering CMM

Software Acquisition

5 Levels of Product Dvlpmnt Capability

Software

Software CMM

Software Acquisition CMM

Integrated Product Development

Integrated Product Development CMM

Note- additional CMMs exist, but not shown

CMM- Capability Maturity Model

Why is CMM useful for SID?

7

Software Engineering Institute
Carnegie Mellon University

What Are the Benefits of Model-Based Improvement?

Establish a common language
• forge a shared vision

Build on a set of processes and practices developed with input from a broad section of the software community

Provide a framework for prioritizing actions

Provide a framework for performing reliable and consistent appraisals

Support industry-wide comparisons

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What's The Benefit of CMM

Good

Bad

Customer Satisfaction

Staff Morale

Quality

Ability To Meet Schedule

CMM
Level 1

CMM
Level 2

CMM
Level 3

9
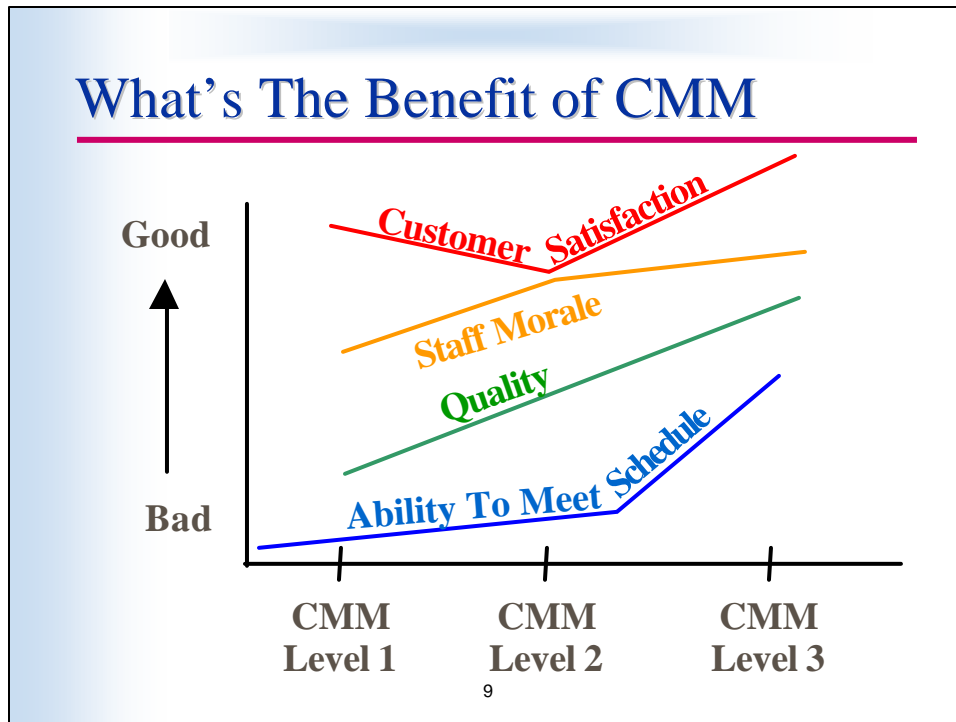
Carnegie Mellon University
Software Engineering Institute

Process Improvement Is A Lifestyle Change

Silver Bullet = Diet

95% of all dieters regain the weight they have lost… and more… within one year of a diet

Process Improvement = Lifestyle Change

60% of those who change their lifestyle to eat less and exercise more maintain their weight loss

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Let Common Sense Prevail!

Process Rigor

	Yes	No
Common Sense — Yes	Quality	Creative Chaos
Common Sense — No	Mindless Bureaucracy	Mindless Chaos

With thanks to Sanjiv Ahuja, President and COO of Telcordia Technologies.

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What does CMM mean to me?

12

What does CMM mean to me?

- **Understanding that the organization is committed to improvement**
- **Centralized location for shared information**
  - **Definition of common terms, life cycle and processes, and roles and responsibilities**
  - **Samples and templates for products**
  - **Resources available when you need them**

13

What does CMM mean to me?

- **Isn't CMM just for managers?**
  - **CMM is a way for managers to evaluate the effectiveness of their operations**
  - **Problems may indicate a need for**
    - ▶ **More training for staff**
    - ▶ **A change to the way things are currently done**
    - ▶ **More staff to help get things done**
  - **If staff are not aware and involved, then CMM cannot help the organization**
  - **You may not use it every day or think about it that often – just know that it is there**

14

How does CMM work?

15

SA-CMM: How It Works

■ **Maturity Levels**

--------> Level 5: Optimizing

--------> Level 4: Quantitative

--------> Level 3: Defined

--------------> Level 2: Repeatable

--------------------> Level 1: Initial

16

SA-CMM: Level 1

- **Culture**
  - **Success is based on individuals**
  - **Ad hoc decision-making**
  - **Occasionally chaotic environment**
  - **Few process are defined**

- **Focus For Maturity**
  - **Install basic management controls**
  - **Instill self-discipline**

- **Level 1: Initial**

17

SA-CMM: Level 2

- **Culture**
  - **Basic PM Process exist**
  - **Self-discipline exists for project by project only**
  - **Activities are reactive**
  - **Repeatability is possible**

Level 2: Repeatable

18

SA-CMM: Level 2 (cont.)

Level 2: Repeatable

■ **Key Process Areas**
- SW Acquisition Planning
- Solicitation
- Requirements Development & Management
- Project Management
- Contract Tracking & Oversight
- Evaluation
- Transition To Support

19

SA-CMM: Level 2 (cont.)

Level 2: Repeatable

■ **Focus For Maturity**
- Think organizationally… "we-the project" becomes "we-the organization"
- Use well-defined processes for improvement.

20

SA-CMM: Level 3

Level 3: Defined

- ■ **Culture**
  - ● **Organizational processes are documented & standardized**
  - ● **Processes are tailored to fit**
  - ● **Activities are proactive**
  - ● **Risk management is active**
  - ● **Training is commonplace**

21

SA-CMM: Level 3 (cont.)

Level 3: Defined

- ■ **Key Process Areas**
  - ● **Process Definition and Maintenance**
  - ● **Project Performance Management**
  - ● **Contract Performance Management**
  - ● **Acquisition Risk Management**
  - ● **Training Program**

22

SA-CMM: Level 3 (cont.)

Level 3: Defined

- ■ **Focus For Maturity**
  - ● **Decision making based on quantitative measures (metrics)**
  - ● **Measuring for success**

23

SA-CMM: Level 4

Level 4: Quantitative

- ■ **Culture**
  - ● **Detailed measurements are collected**
  - ● **Processes are quantitatively and qualitatively understood and controlled**

24

SA-CMM: Level 4 (cont.)

Level 4: Quantitative

- ■ **Key Process Areas**
  - ● **Quantitative Process Mgmt**
  - ● **Quantitative Acquisition Mgmt**

- ■ **Focus For Maturity**
  - ● **Continuous Process Improvement (CPI)**
  - ● **Innovation and use of technology for CPI**

25

SA-CMM: Level 5
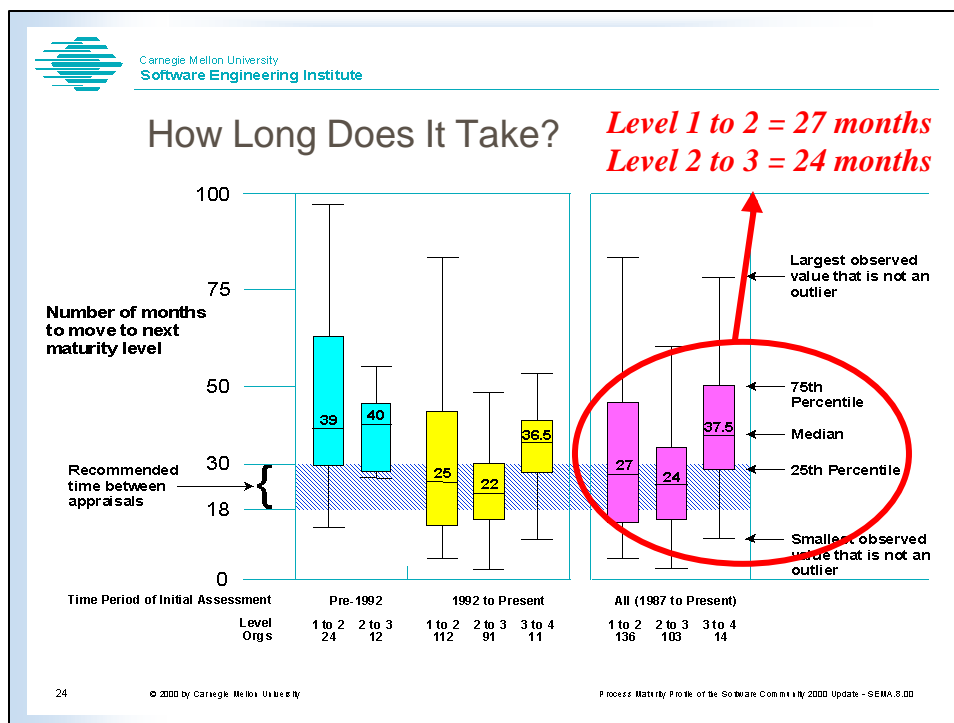
Level 5: Optimizing

- ■ **Culture**
  - ● **Continuous Process Improvement (CPI)**
  - ● **Innovation and use of technology for CPI**

- ■ **Key Process Areas**
  - ● **Acquisition Innovation Management**
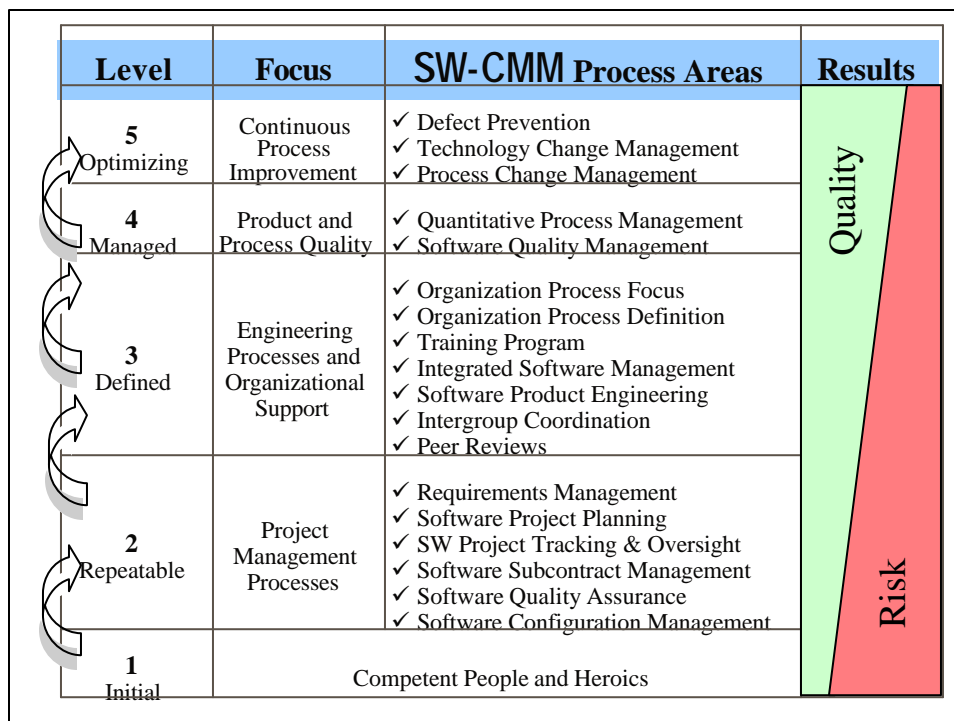 - ● **Continuous Process Improvement (CPI)**

26

How Long Does It Take?

Level 1 to 2 = 27 months
Level 2 to 3 = 24 months

What's the difference between SA-CMM and SW-CMM?

28

Level	Focus	SA-CMM Process Areas	Results
5 Optimizing	Continuous Process Improvement	✓ Acquisition Innovation Mgmt ✓ Continuous Process Improvement	Quality
4 Managed	Product and Process Quality	✓ Quantitative Acquisition Mgmt ✓ Quantitative Process Management	
3 Defined	Engineering Processes and Organizational Support	✓ Training Program ✓ Acquisition Risk Management ✓ Contract Performance Mgmt ✓ Project Performance Management ✓ Process Definition & Maintenance	
2 Repeatable	Project Management Processes	✓ Transition To Support ✓ Evaluation ✓ Contract Tracking & Oversight ✓ Project Management ✓ Rqmts Development & Mgmt ✓ Solicitation ✓ Software Acquisition Planning	Risk
1 Initial	Competent People and Heroics		

Level	Focus	SW-CMM Process Areas	Results
5 Optimizing	Continuous Process Improvement	✓ Defect Prevention ✓ Technology Change Management ✓ Process Change Management	Quality
4 Managed	Product and Process Quality	✓ Quantitative Process Management ✓ Software Quality Management	
3 Defined	Engineering Processes and Organizational Support	✓ Organization Process Focus ✓ Organization Process Definition ✓ Training Program ✓ Integrated Software Management ✓ Software Product Engineering ✓ Intergroup Coordination ✓ Peer Reviews	
2 Repeatable	Project Management Processes	✓ Requirements Management ✓ Software Project Planning ✓ SW Project Tracking & Oversight ✓ Software Subcontract Management ✓ Software Quality Assurance ✓ Software Configuration Management	Risk
1 Initial	Competent People and Heroics		

An example of a CMM assessment

31

Project Assessment Objectives

- **To understand the context and content of the SW-CMM Level 2 Key Practice Areas (KPAs).**
- **To relate SW-CMM KPAs to the project in a meaningful way.**
- **To add value to the project (and SID) by affording opportunities to improve business practices.**

32

Review of Assessment Schedule

- **The Plan**
  - **SA-CMM Overview**
  - **Review Supporting Documentation and Processes (Phase 2)**
  - **Make Assignments to Prepare for Interviews**
  - **Conduct Interviews**
  - **Prepare Findings Report**
  - **Debrief w/ Team**
  - **Share Good Examples with Other Projects and Put on BPweb**

SA-CMM Overview	→	Individual Preparation	→	Interviews	→	Report Prep	→	Team Debrief

33

Time Expectation On The Team!

- **Team Overview Session (1.5 hours)**
- **Preparation for the Interview (1.5 hours per person)**
  - **Read the SA-CMM Introduction section.**
  - **Read your assigned SA-CMM handbook section(s).**
  - **Translate the checklist inquiry to life on the project. What does it mean for the project?**
  - **Be comfortable with how the Interview Process will work.**
- **The Interview (0.5 – 1.5 hours for each of the 12 KPAs)**
  - **Team discussion w/ Tom, Laura, and managers.**
  - **Define what the Artifact is (or should be) that will prove adherence.**
  - **Determine a rating for each item (FS, PS, NS,NR, NA).**
- **Review Findings Report / Team Debrief (1-2 hours)**
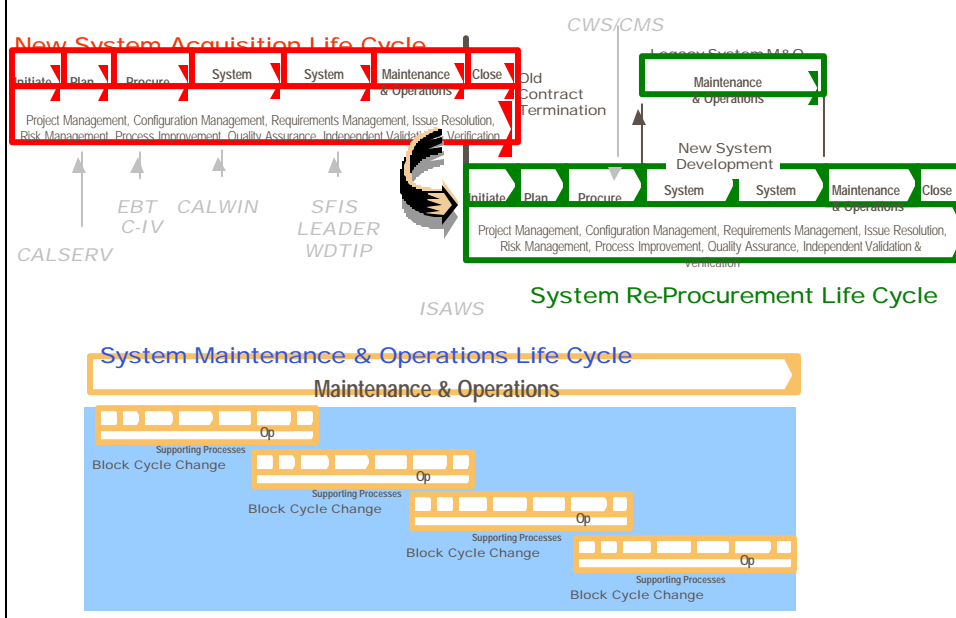
34

The Evaluation Checklist (Example)

SA-CMM - Level 2 Evaluation Criteria

1/26/01

SA-CMM - Level 2		CMM Ref	SID Ref	FS	PS	NS	NR	NA
	Observations	CMM Ref	SID Ref	FS	PS	NS	NR	NA
KPA:	2.1 Software Acquisition Planning							
2.1.1	The acquisition organization has a written policy for planning the software acquisition.	SAP.CO.1						
2.1.2	Responsibility for software acquisition planning activities is designated.	SAP.CO.2						
2.1.3	A group that is responsible for planning the software acquisition exists.	SAP.AB.1						
2.1.4	The acquisition organization provides experienced software acquisition management personnel to support project software acquisition planning.	SAP.AB.2						

35

Where is the Project In The System Life Cycle?

New System Acquisition Life Cycle

CWS/CMS

Initiate | Plan | Procure | System | System | Maintenance & Operations | Close | Old Contract Termination

Legacy System M&O
Maintenance & Operations

Project Management, Configuration Management, Requirements Management, Issue Resolution, Risk Management, Process Improvement, Quality Assurance, Independent Validation & Verification

New System Development

EBT CALWIN SFIS
C-IV LEADER
WDTIP
CALSERV

Initiate | Plan | Procure | System | System | Maintenance & Operations | Close

Project Management, Configuration Management, Requirements Management, Issue Resolution, Risk Management, Process Improvement, Quality Assurance, Independent Validation & Verification

ISAWS

System Re-Procurement Life Cycle

System Maintenance & Operations Life Cycle
Maintenance & Operations

Op
Supporting Processes
Block Cycle Change
Op
Supporting Processes
Block Cycle Change
Op
Supporting Processes
Block Cycle Change
Op
Supporting Processes
Block Cycle Change

CMIPS Lifecycle / Rating Scheme

Init		Planning			Procurement				System Development							Sys Implementation					M & O	Close-Out			
M 1	M 2	M 1	M 2	M 3	M 1	M 2	M 3	M 4	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 1	M 2	M 3	M 4	M 5		M 1	M 2	M 3	M 4
					X																				

Rating	Definition	Explanation	Scoring Value
FS	Fully Satisfied	The project has fully demonstrated the discipline and has tangible artifacts to back up the claim.	1-point times the raw FS score.
PS	Partially Satisfied	The project has demonstrated portions of the discipline and has some tangible evidence to show.	½-point times the raw PS score.
NS	Not Satisfied	The project does not practice this discipline at all.	0-points times the raw NS score.
NR	Not Required	The discipline (while applicable to the project) is not a required practice for the project's current life cycle phase. Thus, the discipline is not to be considered in the scoring process.	Not Applicable
NA	Not Applicable	This practice does not at all apply to the project's business practices and is not to be considered in the scoring process.	Not Applicable

37

CMIPS SA-CMM Evaluation

■ Level 2 Summary

Level 2 Key Practice Areas (KPAs)	FS	PS	NS	NR	NA	Score
Software Acquisition Planning (15)	9	2	1	1	2	.83
Solicitation (18)	8	5	0	5	0	.81
Requirements Development & Management (14)	5	3	1	4	1	.72
Project Management (16)	12	2	1	1	0	.87
Contract Tracking & Oversight (17)	3	0	1	13	0	.75
Evaluation (15)	6	0	1	8	0	.86
Transition To Support (16)	5	0	1	10	0	.83
Total (111)	48	12	6	42	3	.82

FS = Fully Satisfied
PS = Partially Satisfied
NS = Not Satisfied
NR = Not Required (at this phase of the life cycle)
NA = Not Applicable

( ) = The # of disciplines associated with each KPA.

$[48+0.5\times12] / [48+12+6] = 54/66 = \underline{0.82}$

See KPA-Level Evaluation Forms

CMIPS SA-CMM Evaluation

■ **Level 3 Summary**

Level 3 Key Practice Areas (KPAs)	FS	PS	NS	NR	NA	Score
Process Definition & Maintenance (16)	8	3	5	0	0	.59
Project Performance Management (16)	8	6	2	0	0	.69
Contract Performance Management (12)	1	0	1	10	0	.50
Acquisition Risk Management (15)	11	3	1	0	0	.83
Training Program (14)	8	4	1	0	1	.77
Total (73)	36	16	10	10	1	.71

FS = Fully Satisfied
PS = Partially Satisfied
NS = Not Satisfied
NR = Not Required (at this phase of the life cycle)
NA = Not Applicable

( ) = The # of disciplines associated with each KPA.

$[36+0.5\text{x}16] \setminus [36+16+10] = 44/62 = \underline{0.71}$

See KPA-Level Evaluation Forms

Team Strengths

■ **The team is genuinely receptive to improving their business processes (a great attitude).**

■ **The team has taken full advantage of the best practices available from the Best Practices Website.**

■ **The team is knowledgeable in the areas assigned to their responsibilities.**

■ **Some members have a wealth of CMM expertise that will greatly help during the improvement steps.**

40

The "Not Satisfied (NS)" Areas

- **Level 2 - Six occurrences**
  - No formal SID Policy letters (6).
- **Level 3 – Ten occurrences**
  - No formal SID Policy letter (5).
  - No formal training on the SID standard processes (1).
  - No documented process for the Process Team (1).
  - No independent appraisal of Process Team activities (1).
  - No tailoring guidance for standard processes (1).
  - Lessons learned not captured in central repository (1).

41

Recommendations From the Review

- **For the Project**
  - Include variance analysis as part measurements for project status
  - Seek funding for IV&V support that is currently lacking
  - Seek the CDSS resources currently lacking
  - Capture Lessons Learned at each phase-end and place them in a central repository
- **For the SID Organization/Management**
  - Prepare policies on how CMM is used within the organization
  - Establish tailoring guides for the Best Practices processes
  - Establish regular forums to allow projects to share information and to keep projects aware of the process improvement efforts

42

A Scenario For Benefits Between Projects

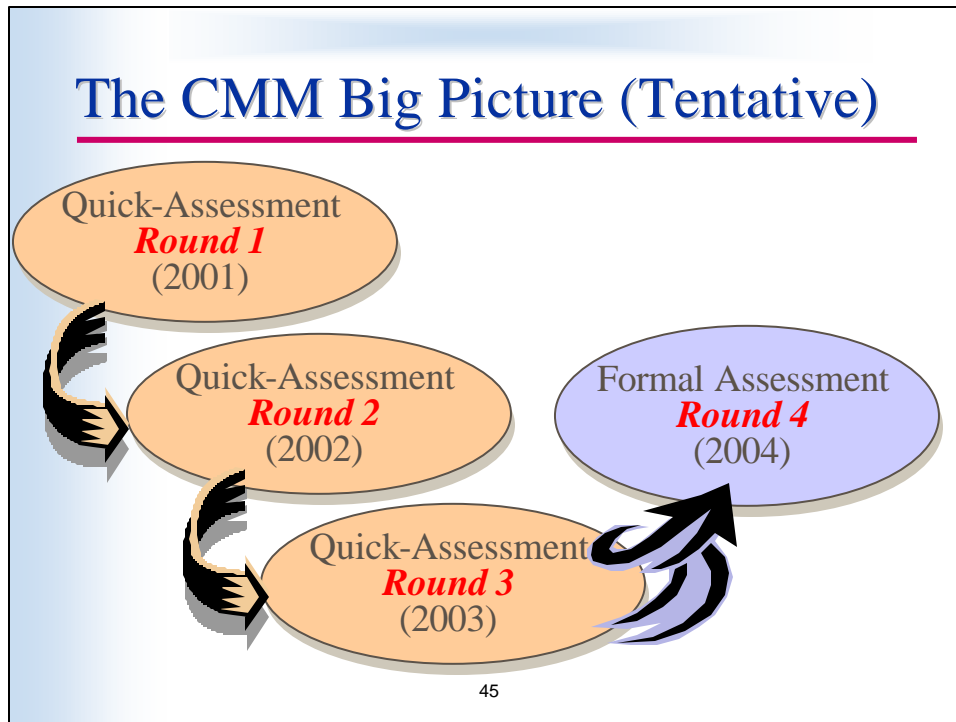|	Software Acquisition Planning						Training Program							
	CO.1	CO.2	AB.1	AB.2	AB.3	AC.1	AC.1	AC.2	AC.3	AC.4	AC.5	AC.6	ME.1	VE.1
CMIPS	NS	FS	FS	FS	FS	NA	FS	FS	FS	NA	FS	PS	FS	FS
Project X	NS	NS	FS	FS	FS	NA	NS	FS	FS	NA	FS	PS	FS	FS
Project Y	NS	NS	FS	FS	FS	NA	NS	FS	FS	NA	FS	PS	FS	FS
Project Z	NS	NS	FS	FS	FS	NA	NS	FS	FS	NA	FS	PS	FS	FS

43

Lessons Learned From The Process

- **Initially felt like being put on the spot. The experience can be intimidating.**
- **The PM's presence for moral support helped.**
- **Include the entire team on the results debrief.**
- **It was a good way to reassure the team that they are moving in the right direction.**
- **It would be helpful to see the bigger picture of the SID CMM journey…are we ever going to be formally certified?**

44

The CMM Big Picture (Tentative)

Quick-Assessment
Round 1
(2001)

Quick-Assessment
Round 2
(2002)

Quick-Assessment
Round 3
(2003)

Formal Assessment
Round 4
(2004)

45

Questions?

Visit Our Website @
http://bpweb = or =

http://www.bestpractices.cahwnet.gov

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46